

The *Monosyntaxis* Swinhoe, 1901 complex of sibling species in New Guinea (Lepidoptera: Erebidae: Arctiinae: Lithosiini)

ROB DE VOS

Naturalis Biodiversity Center (RMNH), Department of Entomology, Darwinweg 2, NL-2333 CR,
Leiden, The Netherlands; rob.devos@naturalis.nl

Abstract: Six new species of *Monosyntaxis* Swinhoe, 1901 have been discovered in New Guinea. They belong to a complex of sibling species of which some are difficult to distinguish by wing pattern alone from the common *M. bipunctata* (Bethune-Baker, 1904) from Southeast Papua New Guinea. However, the genitalia are strikingly different, and the aedeagi especially proved to have distinct diagnostic characters. The new species are *M. honeyi* sp. nov., *M. fojaensis* sp. nov., *M. kobowrensis* sp. nov., *M. arfakensis* sp. nov., *M. kratkeensis* sp. nov., and *M. postfuscata* sp. nov. All the new species seem to occur allopatrically in the high mountain areas of New Guinea and are described here and compared with the already known *M. bipunctata* (Bethune-Baker, 1904), *M. persimilis* Rothschild, 1912 and *M. bimaculata* De Vos, 2009.

Key words: Revision, *Monosyntaxis*, New Guinea.

Introduction

In the overview on the genus *Monosyntaxis* Swinhoe, 1901 by De Vos (2009) nine species are listed which are distributed in Sundaland, the Philippines, Sulawesi, New Guinea and Samoa, of which three were endemic to New Guinea. With the discovery of six new species in New Guinea, the total number of species in the genus increases to fifteen. Another species that previously has been arranged in this genus, *Oeonistis metallescens* Rothschild, 1912, has been transferred to the genus *Papuasyntaxis* De Vos, 2009.

The species of the genus *Monosyntaxis* can be divided into two distinct colour groups: in the area west of New Guinea males are mostly black with red markings, while females are much larger and have a yellow with black bar-pattern. In New Guinea and Samoa, both males and females of all species are silvery white or pale yellow with blackish markings; females are larger than males but with less pronounced sexual dimorphism. Remarkable is the absence of species in the Moluccas which led Holloway (2001) to suggest that the species from New Guinea and Samoa would probably not be related to the western group which includes the type of the genus, *Monosyntaxis trimaculata* (Hampson, 1900). Holloway (pers. comm.) states that both,

the western group and the eastern group presumably are monophyletic groups. The question then is whether there are synapomorphies to show that these groups have a sister-relationship or whether they both belong to a general mix of genera thrown in *Chrysaeglia* Butler, 1877, *Oeonistis* Hübner, 1819, *Papuasyntaxis* De Vos, 2009 and so on, with forewing facies that is diversely patterned with iridescent bluish black and pale yellow to white. But, despite the gap in distribution and the striking differences of both groups, the morphology of the genitalia indicate that they most likely are congeneric or at least belong to a group of closely related genera so for the moment the species treated in this overview are considered to belong to *Monosyntaxis*. A broader cladistic analysis on morphology is needed to understand the relations between the genera and it would be interesting to have a molecular analysis of both groups in the future to test this.

The two common previously known species from New Guinea, *Monosyntaxis bipunctata* and *M. persimilis*, are easily distinguished by the differently shaped black markings on the silvery white forewings. A third species, again easily distinguished by the large round patches on the forewings, was recently found in the Foja Mountains: *M. bimaculata* De Vos, 2009.



Previously it was assumed that *M. bipunctata* and *M. persimilis* were widely distributed all over New Guinea, but now it appears that the first species is restricted to the southeastern part of the island. In the western part the specimens similar to *M. bipunctata* appear to belong to different species. At least six additional sibling species were discovered. It appears that larger isolated mountain ranges have their own species, in the Arfak Mountains, the Kobowre (Weyland) Mountains, the Foja Mountains and the Jayawijaya Mountains in Indonesian New Guinea, and the Kratke Mountains and the Owen Stanley Range in Papua New Guinea. It would be wise to check material from other isolated areas too to confirm this and perhaps to discover more isolated species of this complex. For instance the isolated Finisterre Mountain Range in Papua New Guinea, from which *bipunctata* phenotype specimens are known but not yet investigated on genitalia, could inhabit a new species. The wide distribution gap of the species complex in the center and west of Papua New Guinea, as shown in plate 101 (figs 3-4), is striking. It is probably due to poor sampling rather than absence of specimens in that area. It would be most interesting to have material from that wide and probably varied area to study in more detail.

Abbreviations used

Fwl – Forewing length (measured from wingbase to apex);
 mm – millimeters;
 PNG – Papua New Guinea.
 BMNH – Natural History Museum (former British Museum for Natural History, London, United Kingdom);
 CMWM – collection Thomas Witt, München (assigned to Zoologische Staatssammlung München, Germany);
 KSP – Kelompok Serangga Papua (collection of Br. Henk van Mastrigt, Jayapura, Papua, Indonesia);
 MZB - Museum Zoologicum Bogoriense, Cibinong, Java, Indonesia;
 RMNH – Naturalis Biodiversity Center (former Rijksmuseum voor Natuurlijke Historie and Nationaal Natuurhistorisch Museum), Leiden, The Netherlands;
 UNCEN – University of Cenderawasih, Waena, Papua, Indonesia;
 ZMAN – Naturalis Biodiversity Center (former Zoölogisch Museum van Amsterdam), The Netherlands.

Material and methods

For the study of the species it was necessary to dissect the genitalia of at least one male and female when available. The dissected genitalia are put in cold KOH 10 % for one night. After washing and cleaning from fat, scales and dirt in 30% alcohol the genitalia were stained in a solution of chlorazol-black in 30% alcohol and affixed in 95% alcohol. Then the genitalia were prepared for preservation in Euparal Essence (to prevent air bubbles) and after a few minutes put on a glass slide in a few drops of Euparal medium on the standard as used in the Natural History Museum in London: abdomen on left side, genital armature top right, aedeagus bottom right. To prevent the smaller parts, like aedeagus, from floating the Euparal drops were left to dry at least 24 hours without glass cover in a closed petri-dish (to protect against dust). The next day a proper sized glass cover was put on the pre-prepare in the sticky Euparal with addition of a few fresh drops of Euparal. This complete pre-prepare is left to dry for weeks to months in the petri-dish. Proper slide labels are added after completely drying, so therefore it is necessary to write pre-prepare number and details on the petri-dish cover and to scratch the number on the glass slide to avoid mixing up with other drying slides.

Slides were studied with a WILD M3 binocular microscope with magnifications 60-400x. Digital photographs were made with a motorized Zeiss V20 binocular microscope and a digital Axio MRc5 camera controlled by AxioManager M2 software.

Descriptions

General diagnosis of the *Monosyntaxis bipunctata* complex

Male antenna black or dark grey-brown, bipectinate. Female antenna filiform ciliated. Head and at least patagia dorsally golden to pale yellow, meso- and metathorax with black pattern which can be much extended, white posteriorly, tegulae with a black central spot which can cover the whole tegulae in some species. Abdomen dorsally grey-white with, in males, a golden yellow anal tuft.

Forewings more or less shiny silvery white with two blackish spots with steel blue iridescence: a larger mid-dorsal one and a smaller distal one. Hindwings in males white, in females usually with a more or less yellow tinge.

Specific diagnoses are mentioned for each



species below.

Male genitalia with uncus small, heart-shaped with long setae. Tuba analis usually much larger than uncus. Tegumen arched and rather narrow. Valvae elongate, distal third longitudinally divided into costal and saccular halves. Cucullus width is diagnostic, sacculus at inner ridge in basal half covered with short setae, gradually narrowing to an apical extension with a club-shaped apex that carries a ridge of small teeth, apex slightly bent upwards with a group of thorns. Juxta simple, shield-shaped. Saccus well developed, V-shaped and bent downwards as a spoon. Aedeagus is highly diagnostic, short with tube of aedeagus broad, ventro-distally extended. Vesica with one or two characteristic cornuti.

Female genitalia with well developed sclerotized cervix bursae of which the shape and size are diagnostic. Ductus seminalis originating at the base of the cervix bursae. Bursa copulatrix with one small signum at the bottom of the bursa.

***Monosyntaxis bipunctata* (Bethune-Baker, 1904)**

(Plate 92 figs 1-2, plate 94 figs 2-5, plate 99 figs 1-2)

Chrysaeglia bipunctata Bethune-Baker (1904: 420); Draudt (1914: 201).

Monosyntaxis bipunctata: Rothschild (1912: 224) [in part]; Strand (1922: 595); Holloway (2001: 291); De Vos (2009: 3) [in part].

Holotype ♂ BMNH, British New Guinea [Papua New Guinea], Dinawa, viii.1902, A.E. Pratt.

Note: In BMNH a specimen, originating from Mt. Kebea [PNG], is erroneously labeled with the holotype label. In his original publication Bethune-Baker (1904) designated the Dinawa specimen as type. Furthermore one specimen is present in this series from Aroa River [PNG].

Diagnosis: Fwl. ♂ 15.4-16.8, ♀ 20.5-20.9 mm. Shiny silvery white forewings with sharply defined blackish steel blue spots. Spots in male rather small, mid-dorsal spot is a short straight bar, the distal spot is not distinctly elongated. Hindwing of male pure white, in female bone-white gradually darkening to pale yellow marginally.

Genitalia: Male genitalia (BM6290) with valvae rather narrow, cucullus broad, apical extension of sacculus with club-shaped apex with a ridge of small teeth, apex bent upwards with a group of short thorns. Aedeagus short with strongly constricted coecum, tube of aedeagus broad, ventro-distally with a shoe-shaped extension. Vesica short and globular with two cornuti, a larger one at base

of vesica being elongated and with smooth surface and four marginal teeth directed caudally, and a smaller one distally with one thorn.

Female genitalia (BM6291) with caudal part of ostium with sclerotized rim, followed by a relatively short sclerotized and ventrodorsally flattened cervix bursae. At the bottom of the pear-shaped bursa copulatrix a small round signum with rose-shaped circular rows of shallow blunt teeth.

Distribution: Southeastern part of Papua New Guinea in the Owen Stanley Range. Reported localities are Dinawa, Mt. Kebea, Aroa River, Owgarra, Biagi, Mambare River, Angabunga River, Avola, Moroka, Mt. Mafulu, Hydrographer Mts.

Examples from the Finisterre Mountain Range are present in the BMNH but have not been checked. This isolated mountain range is far more north than the Owen Stanley Range and it could be that a different species is represented there.

***Monosyntaxis kratkeensis* sp. nov.** (Plate 92 fig. 3, plate 95 figs 1-4)

Monosyntaxis bipunctata: Rothschild (1912: 224) [in part]; De Vos (2009: 3) [in part].

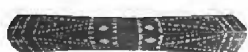
Holotype ♂ BMNH, [Australian] New Guinea, Bantibassa District, Kratke Mts., 4000-5000 ft., vii.1932, F. Shaw Mayer.

Paratypes 3♂ BMNH, same as holotype.

Derivatio nominis: The species is named after the Kratke Mountains where it occurs.

Diagnosis: Fwl. ♂ 14.9-17.5 mm. Externally hard to separate from *M. bipunctata*. The mid-dorsal patch narrower and more curved than in *bipunctata*. Reliable distinguishing characters only in the (male) genitalia, especially in the aedeagus which has different and larger cornuti than in *bipunctata*. Certainly closely related to *bipunctata* which is reflected in the geographic proximity of the distribution areas of both species.

Genitalia: Male genitalia (BM5725) with valvae broad, cucullus with arched costa. Sacculus rather narrow with parallel fold covered with setae. Apical extension of sacculus with truncate apex which carries a crown of thorns. A ridge of small teeth along this extension. Aedeagus short and in general similar to that of *bipunctata* but coecum narrower and with shorter and straighter shoe-shaped extension ventro-distally. The two cornuti on short vesica clearly different, the larger one at base of vesica short with two distinct upright thorns, the distal smaller one shaped like in *bipunctata* but much larger, like a thorn.



Female unknown.

Distribution: Only known from the Kratke Mountains (Eastern Highlands) in Papua New Guinea.

***Monosyntaxis honeyi* sp. nov** (Plate 92 figs 4-5, plate 96 figs 1-3, plate 99 figs 3-4)

Monosyntaxis bipunctata: Rothschild (1912: 224) [in part]; De Vos (2009: 3) [in part].

Holotype ♂ ZMAN, Indonesia, Papua, Central Highlands, Kecamatan Abenaho, Pass Valley, 3°51' S – 139°05' E, 1950 m, 11-17.ii.2005, UNCEN-ZMA Expedition 2005

Paratypes 3♂ BMNH, Centr. Dutch N. Guinea, Mt. Goliath, 5-7000 ft., about 139° long., i.1911 [1 ♂], ii.1911 [2♂♂], A.S. Meek; 1♂ KSP, Indonesia, Irian Jaya, Peg. Bintang, Mabilabol, 28.iii.1982, H. van Mastrigt; 1♂ ZMAN, Indonesia, Irian Jaya, Star Mountains, Abmisibil, 2000 m, 19.viii.1984, H. van Mastrigt; 1♀ ZMAN, Indonesia, Irian Jaya, Baliem Valley, Jiwika, 1600 m, 21.x.1993, A.J. de Boer, A.L.M. Rutten & R. de Vos; 6♂, 6♀, Indonesia, Papua, Central Highlands, Kecamatan Nipsan, Walmak, 4°07' S – 139°38' E, 1710 m, 31.i-9.ii.2005, UNCEN-ZMA Expedition 2005 [1♂ & 1♀ CMWM; 2♂ & 1♀ ZMAN; 1♂ & 2♀ BMNH; 1♂ & 1♀ MZB; 1♂ & 1♀ KSP]; 1♀ ZMAN, Indonesia, Papua, Star Mountains, Abmisibil, 1970 m, 4°40' S – 140°34' E, 29.i-9.ii.2005, UNCEN-ZMAN Expedition 2005; 3♂ & 2♀, Indonesia, Papua, Central Highlands, Kecamatan Abenaho, Pass Valley, 3°51' S – 139°05' E, 1950 m, 11-17.ii.2005, UNCEN-ZMA Expedition 2005 [1♂ & 1♀ ZMAN; 1♂, BMNH; 1♂ & 1♀ MZB]; 1♂ ZMAN, Indonesia, Papua, Landikma, Kec. Abenaho, 914 m, 3°49' S – 139°14' E, 18-22.ii.2009, A.J. de Boer, M. Schouten & R. Mambrasar.

Derivatio nominis: The species is named in honour of the collection manager of the Lepidoptera collection in the Natural History Museum in London, Martin R. Honey, who distinguished this species among the *M. bipunctata* material and which led to a more thorough research with the discovery of all other new *Monosyntaxis* species too.

Diagnosis: Fwl. ♂ 14.7-17.3, ♀ 18.2-20.6 mm. Head and patagia pale orange to bone white, vertex orange. Silky shaded white forewings with the vertical or somewhat oblique blackish blue mid-dorsal marking simple, like a dot or straight bar. The distal dark spot usually elongated and not very sharply edged. The hindwing in the male pure white with the costa yellowish, in the female the hindwing is bone-white with extended yellow coloration in the marginal area.

Genitalia: Male genitalia (RV1258) with valvae

narrow, cucullus straight and narrow, sacculus gradually narrowing to an apical extension with a ridge of small teeth at innerside, and a club-shaped apex which is slightly bent upwards with very short thorns (in *bipunctata* longer, but longer than in *arfakensis*). Juxta simple, shield-shaped. Aedeagus short, strongly diverging from coecum distally to wide, beaker-shaped, vesica with two large cornuti, both dentated on the upperside with about six to seven sharp teeth directed distally. At the base of the vesica are some chitinous drops with setae.

Female genitalia (RV1262) with antrum caudally narrow sclerotized. A broad and large cervix bursae, upper half of cervix bursae more sclerotized than lower part and gradually transforming into the short and broad ductus bursae. Globular bursa copulatrix of about the same size as cervix bursae. One small oval signum with about twenty coarse thorns at the bottom of the bursa copulatrix.

Distribution: The species is found in the Eastern Central Mountains of Indonesian New Guinea: the Star Mountains and the Jayawijaya Mountains. Recently collected *Monosyntaxis* specimens from Mokndoma (northern Snow Mountains) do presumably belong to *M. honeyi* but this needs confirmation by genitalia research. These specimens are left out of the type series of *honeyi*.

***Monosyntaxis fojaensis* sp. nov.** (Plate 92 figs 6-7, plate 96 figs 4-7, plate 99 figs 5-6)

Monosyntaxis bipunctata: De Vos (2009: 3) [in part].

Holotype ♂ ZMAN, Indonesia, Papua, Kab. Sarmi, Peg. Foja, 1650 m, 2°34.5'S 138°42.9'E, 23.xi-7.xii.2005, CI-RAP, leg. H. van Mastrigt.

Paratypes 16♂ & 4♀, same as holotype [6♂ & 1♀ ZMAN; 8♂ & 1♀ KSP; 1♂ & 1♀ MZB; 1♂ & 1♀ BMNH]; 1♂ ZMAN, Indonesia, Papua, Kwerba, Kab. Sarmi, 2°38' S – 138°24' E, 70 m, 29-30.vii.2005, CI-RAP Mamberamo-Foya Exp.

Derivatio nominis: The species is named after the type locality.

Diagnosis: Fwl. ♂ 13.8-16.1, ♀ 15.7-19.3 mm. The smallest of the *bipunctata* complex. Head and patagia bright orange. Shiny silvery white forewings with sharply defined blackish steel blue iridescent spots, the mid-dorsal marking being oblique. Hindwing in male pure white except for the yellowish costa. Hindwings in female pale yellow.

Genitalia: Male genitalia (RV1331) with large uncus extended and bifid at the apex. Tuba analis not much larger than uncus. Valvae rather broad, cucul-



lus with costa arched, sacculus gradually narrowing to an apical extension with club-shaped apex with sharp teeth interiorly, apex slightly bent upwards with longer thorns than in *bipunctata* and *honeyi*. Aedeagus short, horn-shaped with narrow coecum but less constricted than in *bipunctata*. Tube of aedeagus ventro-distally with shoe-shaped extension, smaller than in *bipunctata*. Vesica long and trunk-shaped with two small cornuti, the largest at base of vesica, longitudinal and covered with about ten coarse thorns and three small basal ones, the smallest cornutus at the very end of the trunk with three sharp thorns.

Female genitalia (RV1335) with caudal part of antrum triangularly sclerotized. Cervix bursae large and long, being sclerotized from antrum to base of bursa copulatrix, at right side dorso-ventrally flattened. An irregular shaped signum at the bottom of the bursa with small shallow thorns.

Distribution: The species is probably restricted to the Foja Mountains in Indonesian New Guinea and is found at low and high altitudes. The species was found during the Foja Expedition in 2005 which was organized by the Indonesian Institute of Sciences (LIPI) and Conservation International.

***Monosyntaxis kobowrensis* sp. nov.** (Plate 93 figs 1-2, plate 97 figs 1-3, plate 100 figs 1-2)

Monosyntaxis bipunctata: De Vos (2009: 3) [in part].

Holotype ♂ BMNH, Dutch N. Guinea, Mt. Kunupi, Menoo Valley, Weyland Mts., 6000 ft., xi-xii.1920, C., F. & J. Pratt.

Paratypes 9♂ & 1♀ BMNH, same as holotype: xi-xii.1920 [4♂ & 1♀], xii.1920-i.1921 [5♂], C., F. & J. Pratt; 1♂ BMNH, Dutch N. Guinea, Dewaro Village, Weyland Mtns., 3500 ft., vi.1920, C., F. & J. Pratt; 2♀ RMNH, Nieuw Guinea Exp. K.N.A.G. 1939, Paniai, 10.ix.1939 & 30.x.1939.

Derivatio nominis: The species is named after its area of distribution, the Kobowre Mountains.

Diagnosis: Fwl. ♂: 15.0-16.8, ♀: 18.0-18.5 mm. Head pale yellow, patagia bone-white to pale yellow. Forewings white, in female darker in apical and marginal fringes. Dark brown to blackish markings rather large, the mid-dorsal one in male a semicircle, in female a curved bar, but less "V"-shaped than in *persimilis*. The distal spot is oval, almost equal in size to the mid-dorsal patch. Hindwings in male pure white, in female bone-white darkening to pale yellow apically.

Genitalia: Male genitalia (BM6263) with narrow

valvae, cucullus narrow and stretched with straight costa, sacculus narrow, apical extension with a ridge of small sharp teeth, at apex bent upwards with a group of thorns. Aedeagus rather narrow compared to other species, ventro-distally with a boat-shaped extension, coecum long and narrow. Vesica shoe-shaped with two small cornuti, the basal one being slightly larger, arched and with two thorns, the smaller apical one circular with two thorns.

Female genitalia (RV1340) with cervix bursae sclerotized at the right side and with a collar transforming into the broad ductus bursae. Bursa copulatrix pear-shaped with one small circular signum at the bottom of the bursa, with shallow blunt thorns arranged in a rose-shape.

Distribution: Kobowre Mountains (former Weyland Mountains) in Southwest Papua in Indonesian New Guinea, found at 900-1800 meters. No recent collected specimens are known.

***Monosyntaxis arfakensis* sp. nov.** (Plate 93 figs 3-4, plate 97 figs 4-6, plate 100 figs 3-4)

Monosyntaxis bipunctata: De Vos (2009: 3) [in part].

Holotype ♂ ZMAN, Indonesia, Papua Barat, Birdshead Peninsula, Mokwam, 1510 m, 1°06'S - 133°54'E, 6-10.xi.2011, at light, Papua Insects Foundation.

Paratypes 1♀ BMNH, Dutch New Guinea, Ninay Valley, Central Arfak Mts., 3500 ft., ii-iii.1909 [no leg.]; 1♂ & 1♀ BMNH, North N. Guinea, Angi Lakes, Arfak Mts., 6000 ft., i-ii.1914, A., C. & F. Pratt; 3♂ CMWM, Indonesia, Irian Jaya, Manokwari, Arfak, Ngat Biep, river Ngat Valley, 850 m, 18-19.xii.1993, R. Brechlin & K. Cerny; 10♂ & 1♀, same as holotype [4♂ & 1♀ ZMAN; 2♂ KSP; 2♂ MZB; 2♂ BMNH].

Derivatio nominis: The species is named after its distribution area, the Arfak Mountains.

Diagnosis: Fwl. ♂ 15.1-17.0, ♀ 17.1-19.9 mm. Head and patagia bright orange. Forewings silky white but costa with dark scales and apex and costal part of margin with darkly suffused fringes. Black to dark steel blue markings in male rather small, the mid-dorsal one being a semicircle, the distal one a very small spot. Female with much larger markings, almost equally sized. Mid-dorsal patch a semicircle, the distal patch oval. Hindwings in male white with yellow coloration apically, in female pale yellow.

Genitalia: Male genitalia (BM6262, RV1341) robust, with broad valvae. Cucullus broad with strongly arched costa. Sacculus broadly based, gradually narrowing towards club-shaped apex which is bent



upwards. Apical extension of sacculus with a ridge of small sharp teeth, at apex with a group of thorns which are shorter than in any of the other treated species. Aedeagus robust, short and broad with broad coecum. Vesica short with one large cone-shaped cornutus bearing an extension with four teeth resembling a cogwheel.

Female genitalia (RV1342) with broad sclerotized antrum. Cervix bursae large with broad, sclerotized collar and with thinner sclerotization running through the very broad ductus bursae to the globular bursa copulatrix. One small signum at the bottom of the bursa, elongated with three rows of shallow teeth, accompanied by an isolated chitinous drop but this may be variable.

Distribution: Arfak Mountains in the Birdshead Peninsula of Papua Barat, Indonesian New Guinea. It is found at moderate and high altitudes (850-1800 meters) and is locally rather common.

***Monosyntaxis bimaculata* De Vos, 2009** (Plate 93 fig. 5, plate 98 figs 1-3)

Monosyntaxis bimaculata De Vos (2009: 5).

Holotype ♂ ZMAN, "Indonesia Papua, Kab. Sarmi, Kwerba, 2° 38.63' S - 138° 24.54' E, 29-30.vii.2005, 70 m, CI-RAP Mamberamo-Foya Exp., H. v. Mastrigt.

Paratype 1♂ ZMAN, same as holotype.

Diagnosis: Fwl. 17.0 mm. Head and patagia bone-white. Prothorax black, mesothorax grey-white but dorsally blackish blue with a soft metallic iridescence. Forewing bone-white, not silvery white as in the other species. The rim of the costa basally blackish. Two large dark patches, the inner marking metallic blackish blue, drop-shaped and touching the dorsum, the outer marking dark brown and more or less round. Hindwing of the same colour as forewing without any pattern or fading colours.

Female unknown.

Genitalia: Male genitalia (RV1261) with valvae broad, cucullus arched in the middle, at the apex of the cucullus with a strongly sclerotized rim, sacculus broadly based, narrowing to an apical extension with a short ridge of small teeth and with a short spoon-shaped apex with small thorns, apex curved inwards. Aedeagus very short, strongly diverging from extremely short coecum to wide beaker-shape with a thick worm-like extension ventro-distally. Vesica with one large cornutus, weakly trapezium-shaped with a strong ventral thorn and covered with some coarse warts.

Distribution: Until now only known from low altitude in the Foja Mountains in Papua, Indonesia.

***Monosyntaxis persimilis* Rothschild, 1912** (Plate 93 figs 6-7, plate 98 figs 4-6, plate 100 figs 5-6)

Monosyntaxis persimilis Rothschild (1912: 224); Draudt (1914: 202); Strand (1922: 596); Holloway (2001: 291); De Vos (2009: 4).

Holotype ♂ BMNH, Centr. Dutch N.Guinea [Papua, Indonesia], Mt. Goliath, 5000-7000 ft, about 139 long. [itude], i.1911, A.S. Meek.

Diagnosis: Fwl. ♂ 16-18, ♀ 20-23 mm. Head orange with black vertex, patagia orange, silvery white prothorax caudally black and with a black central spot, tegulae orange with a small black spot and white hairy fringes. Forewing silvery white with two black markings, the mid-dorsal one metallic blackish blue and strongly "V"-shaped pointing outwards, the distal patch dark brown, small and irregular. Hindwing in male pure white with the costa, apical area and fringes along the upper half of the wing suffused with orange-yellow. In the female the hindwing is pale yellow, gradually darkening apically.

Genitalia: Male genitalia (RV1259) with valvae broad, cucullus disc-shaped, forming almost half a circle, sacculus strongly narrowing from broad base to half the valva length, continued by an apical extension with a spoon-shaped apex. A ridge with long sharp teeth at the outer rim of the extension, pointing inwards and increasing in size, at the inwards curved apex a group of long thorns. Aedeagus rather narrow, stretched and of moderate length, gradually broadening and with a boat-shaped extension ventro-distally. Vesica with two small cornuti, basally a larger one with sharp teeth and a small thorn-shaped one distally. At the base of the vesica are numerous chitinous drops with long setae.

Female genitalia (RV1263) with clearly defined broadly based antrum, followed by a broad straight tube which combines the sclerotized cervix bursae and the unsclerotized ductus bursae. Ductus seminalis originating at the base of the cervix bursae. The bursa copulatrix is rather small, globular and contains one oval signum at the bottom of the bursa which is comparatively large with numerous spirals of blunt teeth directed from the center of the signum.

Distribution: The species is mainly distributed in the Central Mountains from west to east through New Guinea, but is, in the Indonesian part, also found in the Paniai area and the Wondiboy Mountains (Wandammen Peninsula).



***Monosyntaxis postfuscata* sp. nov.** (Plate 94 fig. 1, plate 101 figs 1-2)

Holotype ♀ BMNH, British New Guinea, Saiko, Bubu River, Upper Waria River, 5000-6000 ft., ix.1936, F. Shaw Mayer.

Derivatio nominis: The species is named after the dark suffusion of the hindwings which is unusual in this species complex.

Diagnosis: Fwl. ♀ 22.5 mm. Head silky cream-white, patagia orange, tegulae caudally orange, distally white with a black spot. Prothorax black, mesothorax bone-white with two black spots, metathorax dark brown. Abdomen dorsally with pale yellow hairs. Forewings white with costal rim and apical fringes suffused with orange. Base at dorsum with orange-yellow streak. Costa with black subcostal streak. Black markings large with steel

blue iridescence. Mid-dorsal marking strongly "V"-shaped, pointed outwards and touching dorsum. Distal patch irregularly shaped, edges not sharply defined. Hindwings dark grey with orange-yellow margins. The wing pattern and the construction of the genitalia indicate a close relationship with *Monosyntaxis persimilis*.

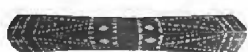
Male unknown.

Genitalia: Female genitalia (BM5726) very similar to that of *persimilis*. The antrum much narrower and the signum almost half the size of *persimilis* with blunt teeth directed to one side of the signum.

Distribution: Only known by one female from the area northwest of the Owen Stanley Range, Waria River.

Key to the *Monosyntaxis* species from New Guinea

- 1 All spots of more or less equal size and shape (round), ground colour bone-white *bimaculata*
- The two black spots on forewing of different shape and size, ground colour white 2
- 2 Middorsal (inner) spot distinctly chevron-shaped 3
- Middorsal (inner) spot oval or at most comma-shaped 4
- 3. Spots very large, middorsal spot strongly chevron-shaped, hindwings dark *postfuscata* (♀)
- Spots of normal modest size, hindwings white (♂) or yellowish (♀) *persimilis*
- 4 Antennae bipectinate, hindwings white 5 (♂♂)
- (male of *postfuscata* unfortunately unknown)
- Antennae filiform (finely ciliated), hindwings more or less yellow 10 (♀♀)
- (females of *bimaculata* and *kratkeensis* unfortunately unknown)
- 5 Aedeagus with one large cornutus, black spots on forewing rather small *arfakensis* (♂)
- Aedeagus with two cornuti 6
- 6 Aedeagus with two large cornuti of almost equal size *honeyi* (♂)
- Aedeagus with two cornuti of different size, distal cornutus much smaller 7
- 7 Vesica trunk-shaped with distally a crown-shaped cornutus consisting of three spines *fojaensis* (♂)
- Vesica not trunk-shaped, cornutus with less than three spines 8
- 8 Aedeagus with ventro-distal extension stretched, not shoe-shaped *kobowrensis* (♂)
- Aedeagus with ventro-distal extension shoe-shaped 9
- 9. Valva rather narrow, extension of sacculus with club-shaped apex *bipunctata* (♂)
- Valva rather broad, extension of sacculus with truncate apex *kratkeensis* (♂)
- 10 Signum irregularly shaped with teeth not clearly defined 11
- Signum regular circular or oval 12
- 11 Signum is an irregular shaped sclerotized patch with shallow teeth, ductus bursae at one side completely sclerotized *fojaensis* (♀)
- Signum small, irregular shaped and broken up in smaller pieces, with few shallow teeth, ductus bursae very broad with sclerotized base *arfakensis* (♀)
- 12 Signum circular, with rose-shaped circular rows of teeth 13
- Signum oval 14
- 13 Base of ductus bursae completely sclerotized *bipunctata* (♀)
- Base of ductus bursae at ventral side sclerotized *kobowrensis* (♀)
- 14 Oval signum with numerous from one side radiated teeth *persimilis* (♀)
- Oval signum regularly dentated with four rows of teeth *honeyi* (♀)



Revised checklist of all *Monosyntaxis* species

<i>affinis</i> Rothschild, 1912	Malayan Peninsula, Sumatra, Java
<i>arfakensis</i> sp. nov	Arfak mts., Papua Barat
<i>bipunctata</i> (Bethune-Baker, 1904)	Owen Stanley Range, SE Papua New Guinea
<i>bimaculata</i> De Vos, 2009	Foja Mts., Papua
<i>fojaensis</i> sp. nov	Foja Mts., Papua
<i>holmanhunti</i> Hampson, 1914	Malayan Peninsula, Sumatra, Java, Bali, Borneo
<i>honeyi</i> sp. nov	Jayawijaya Mts. and Star Mts., Papua
<i>kobowrensis</i> sp. nov	Kobowre Mts., Papua
<i>kratkeensis</i> sp. nov	Kratke Mts., Papua New Guinea
<i>montanus</i> Schulze, 1910	Luzon, Mindanao (The Philippines)
<i>persimilis</i> Rothschild, 1912	New Guinea
<i>postfuscata</i> sp. nov	Papua New Guinea
<i>radiifera</i> Cerny, 1995	Mindanao (The Philippines)
<i>samoensis</i> (Rebel, 1915)	Samoa
= <i>samoana</i> (Gaede, 1925)	
<i>trimaculata</i> (Hampson, 1900)	Borneo

Genitalia slides used	♂	♀
<i>Monosyntaxis arfakensis</i>	BM6262 (BMNH) / RV1341(ZMAN)	RV1342 (ZMAN)
<i>Monosyntaxis bimaculata</i>	RV1261 (ZMAN)	
<i>Monosyntaxis bipunctata</i>	BM6290 (BMNH)	BM6291 (BMNH)
<i>Monosyntaxis fojaensis</i>	RV1331 (ZMAN)	RV1335 (ZMAN)
<i>Monosyntaxis honeyi</i>	RV1258 (ZMAN)	RV1262 (ZMAN)
<i>Monosyntaxis kobowrensis</i>	BM6263 (BMNH)	RV1340 (RMNH)
<i>Monosyntaxis kratkeensis</i>	BM5725 (BMNH)	
<i>Monosyntaxis persimilis</i>	RV1338 (KSP) / RV1259 (ZMAN)	RV1263 (ZMAN)
<i>Monosyntaxis postfuscata</i>		BM5726 (BMNH)

Acknowledgements

This revision was not possible without the help and cooperation of the following colleagues and institutions. First of all I am indebted to Martin Honey (Natural History Museum, London, United Kingdom) who inspired me to take a closer look at and to revise the specimens resembling *Monosyntaxis bipunctata*. Henk van Mastrigt (Kelompok Serangga Papua, Jayapura, Papua, Indonesia) who provided me of specimens from new remote areas resulting in new discovered species. Dr. Jeremy D. Holloway (Natural History Museum, London, United Kingdom) who kindly commented the manuscript and suggested some interesting views concerning the complex of genera where *Monosyntaxis* belongs. Dr. Erik van Nieuwerkerken (Naturalis Biodiversity Center, Leiden, The Netherlands) who as representative of the former RMNH collection allowed me to

study specimens from this collection. Dr. Willem N. Ellis (Amsterdam, The Netherlands) and Kees van den Berg (Naturalis Biodiversity Center, Leiden, The Netherlands) who both helped me with digitalized images of the genitalia. And last but not least the Uyttenboogaart-Eliassen Stichting (The Netherlands) for financing the surveys to Papua which made collection of fresh material and the study of the KSP collection (Jayapura) and that of BMNH (London) possible.

References

- Bethune-Baker G.T. 1904. New Lepidoptera from British New Guinea. – *Novitates zoologicae* **11**, No. 2: 367-429.
- Draudt M. 1914. Arctiidae. In: Seitz A. (ed.) *Die Gross-Schmetterlinge der Erde 10: Spinner und*



Schwärmer des Indo-Australischen Gebiets. Stuttgart, A. Kernen: 134-223.

Holloway J.D. 2001. *The Moths of Borneo part 7: Family Arctiidae, subfamily Lithosiinae*. Kuala Lumpur, Malaysian Nature Society: 486 pp.

Rothschild L.W. 1912. New Lithosianae. – *Novitates zoologicae* **19**, No. 2: 212-246.

Strand E. 1922. *Lepidopterorum Catalogus 26: Arctiidae: Subfam. Lithosiinae*. Berlin, W. Junk: 501-899.

Vos R. de 2009. The species of the genus *Monosyntaxis* Swinhoe from New Guinea, with description of a new species and the transfer of another to a new genus (Lepidoptera: Arctiidae, Lithosiinae). – *Suara Serangga Papua (SUGAPA)* **4**, No. 1: 1-13.



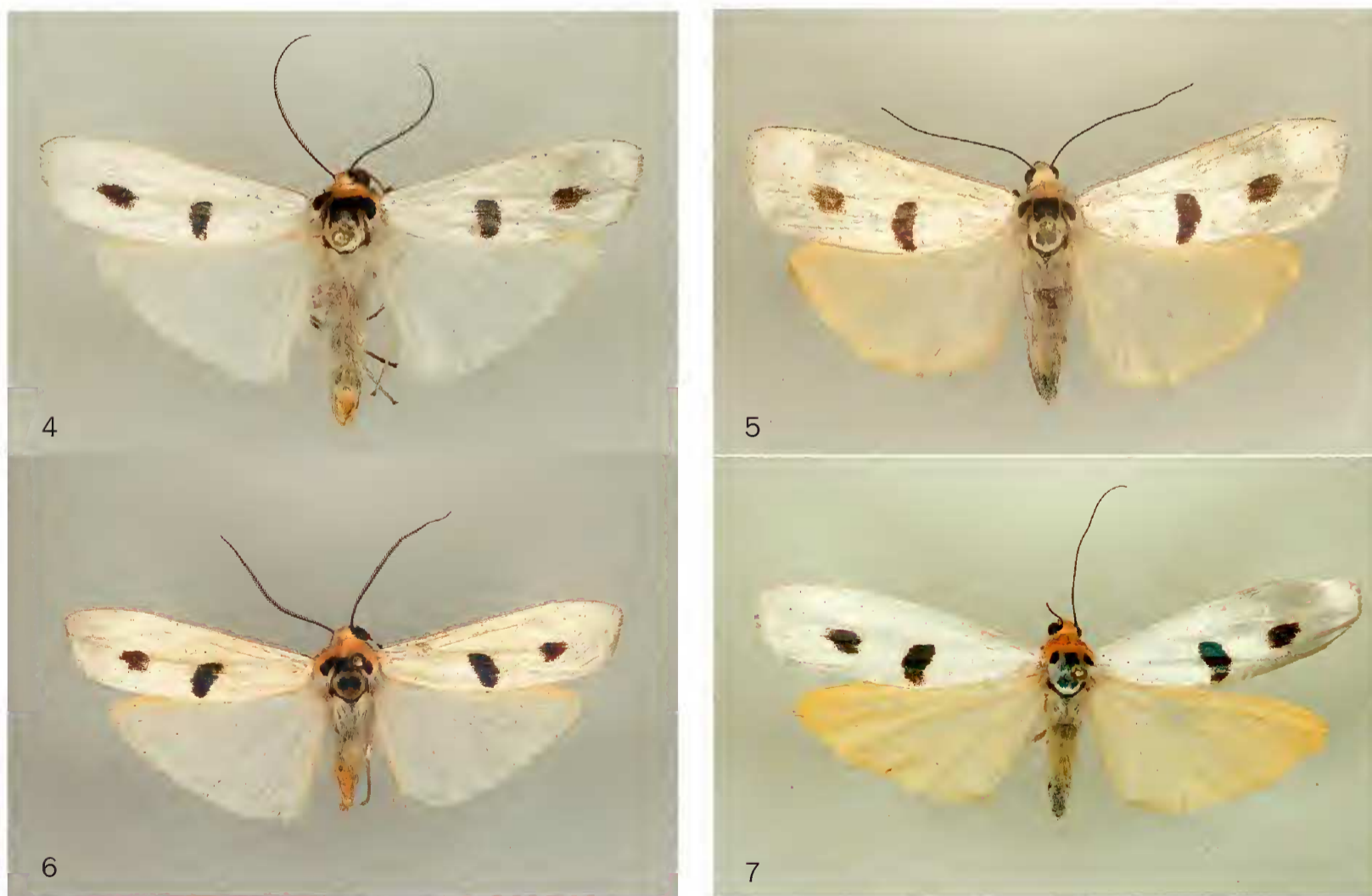


Plate 92

Vos, R. DE: The *Monosyntaxis* Swinhoe, 1901 complex of sibling species in New Guinea (Lepidoptera: Erebidae) ...



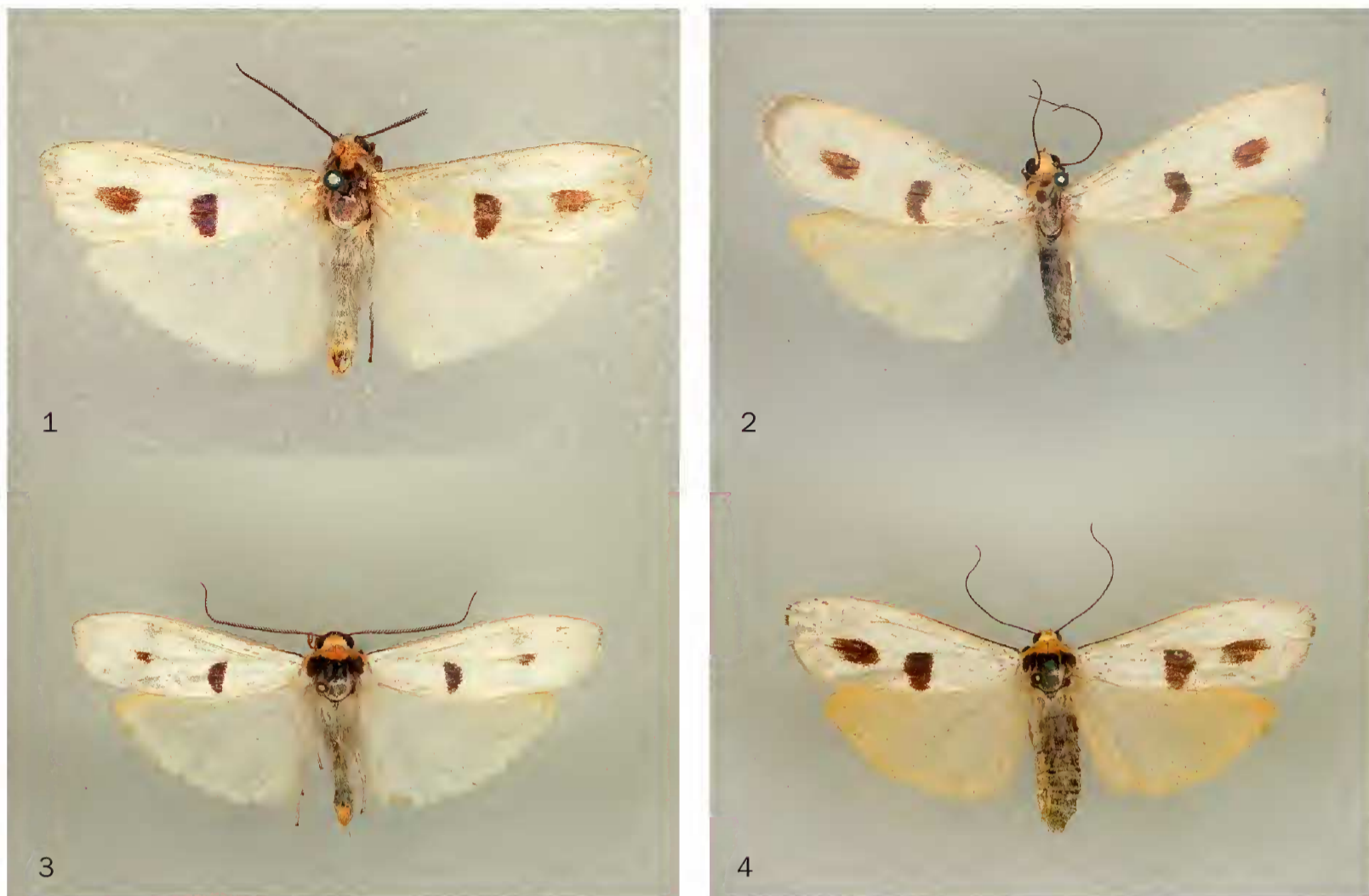
Figures 1-3. Papuan *Monosyntaxis* species. 1-2: *M. bipunctata* (Bethune-Baker, 1904). 1 - ♂, Owgarra, Owen Stanley Range, Papua New Guinea (BMNH); 2 - ♀, Angabunga River, Papua New Guinea (BMNH); 3 - *M. kratkeensis* sp. nov., ♂ holotype, Bantibasa district, Kratke Mountains, Papua New Guinea (BMNH).



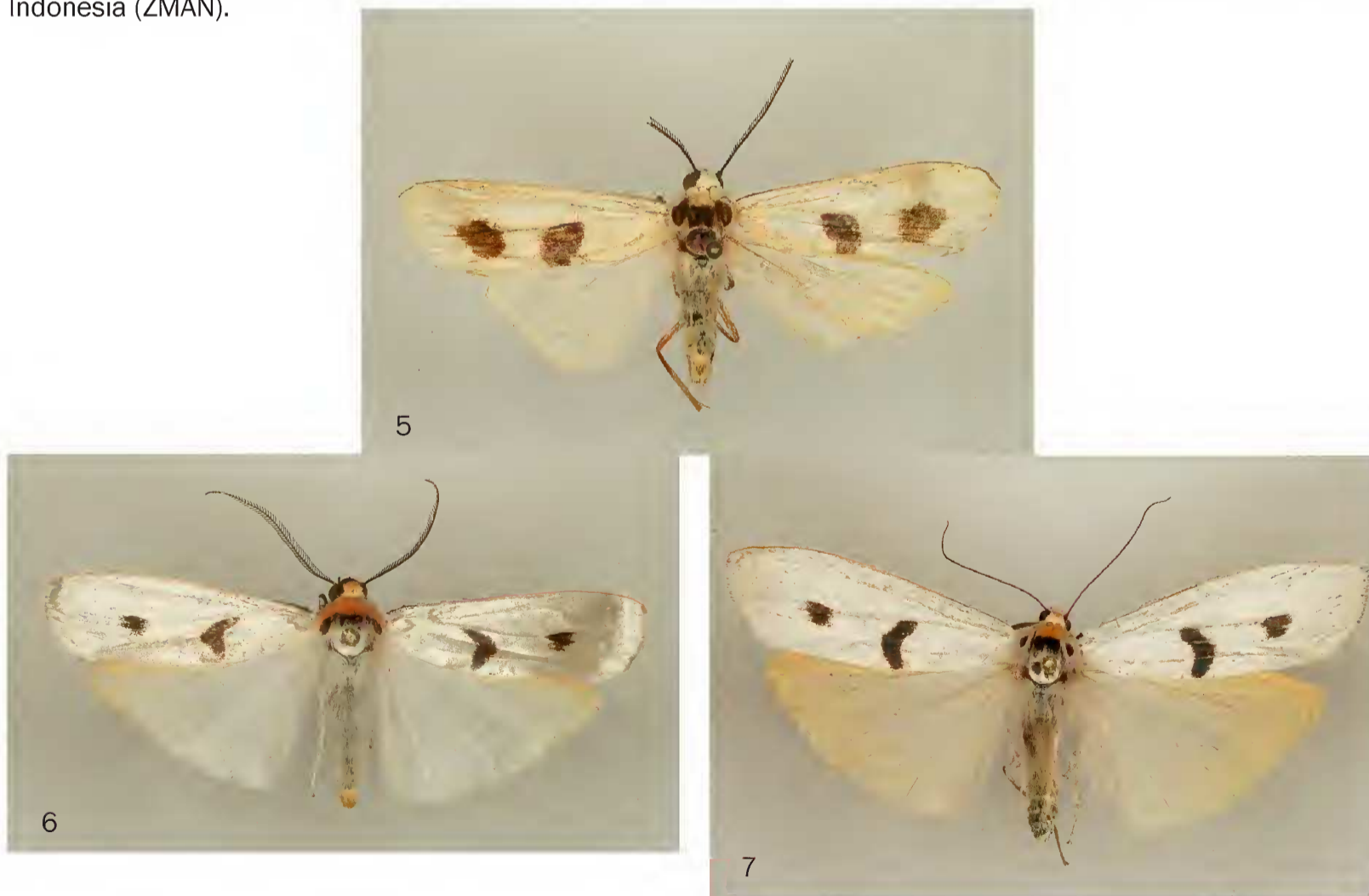
Figures 4-7. Papuan *Monosyntaxis* species. 4-5: *M. honeyi* sp. nov. 4 - ♂ holotype, Pass Valley, Jayawijaya mts., Papua, Indonesia (ZMAN); 5 - ♀ paratype, Walmak, Jayawijaya mts., Papua, Indonesia (ZMAN); 6-7: *M. fojaensis* sp. nov. 6 - ♂ holotype, Foja mts., Papua, Indonesia (ZMAN); 7 - ♀ paratype, Foja Mountains, Papua, Indonesia (KSP).

Plate 93

Vos, R. DE: The *Monosyntaxis* Swinhoe, 1901 complex of sibling species in New Guinea (Lepidoptera: Erebidae) ...



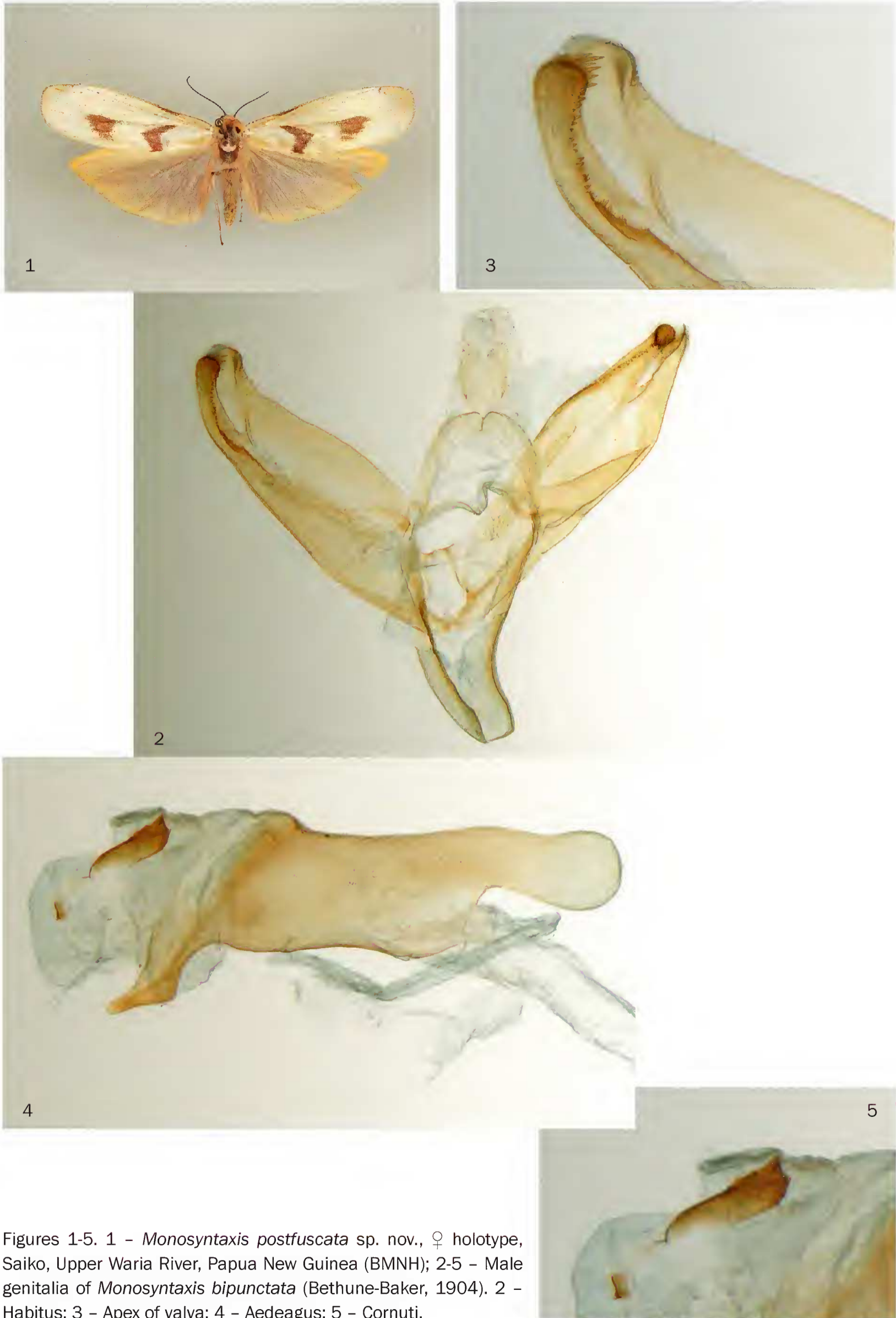
Figures 1-4. Papuan *Monosyntaxis* species. 1-2: *M. kobowrensis* sp. nov. 1 - ♂ paratype, Mt. Kunupi, Kobowre (Weyland) mts., Papua, Indonesia (BMNH); 2 - ♀ paratype, Paniai area, Papua, Indonesia (RMNH); 3-4: *M. arfakensis* sp. nov. 3 - ♂ holotype, Mokwam, Arfak mts., Papua, Indonesia (ZMAN); 4 - ♀ paratype, Mokwam, Arfak mts., Papua, Indonesia (ZMAN).



Figures 5-7. Papuan *Monosyntaxis* species. 5 - *M. bimaculata* De Vos, 2009. ♂ holotype, Kwerba, Foja mts., Papua, Indonesia (ZMAN); 6-7: *M. persimilis* Rothschild, 1912. 6 - ♂, Pass Valley, Jayawijaya mts., Papua, Indonesia (ZMAN); 7 - ♀, Pass Valley, Jayawijaya mts., Papua, Indonesia (ZMAN).

Plate 94

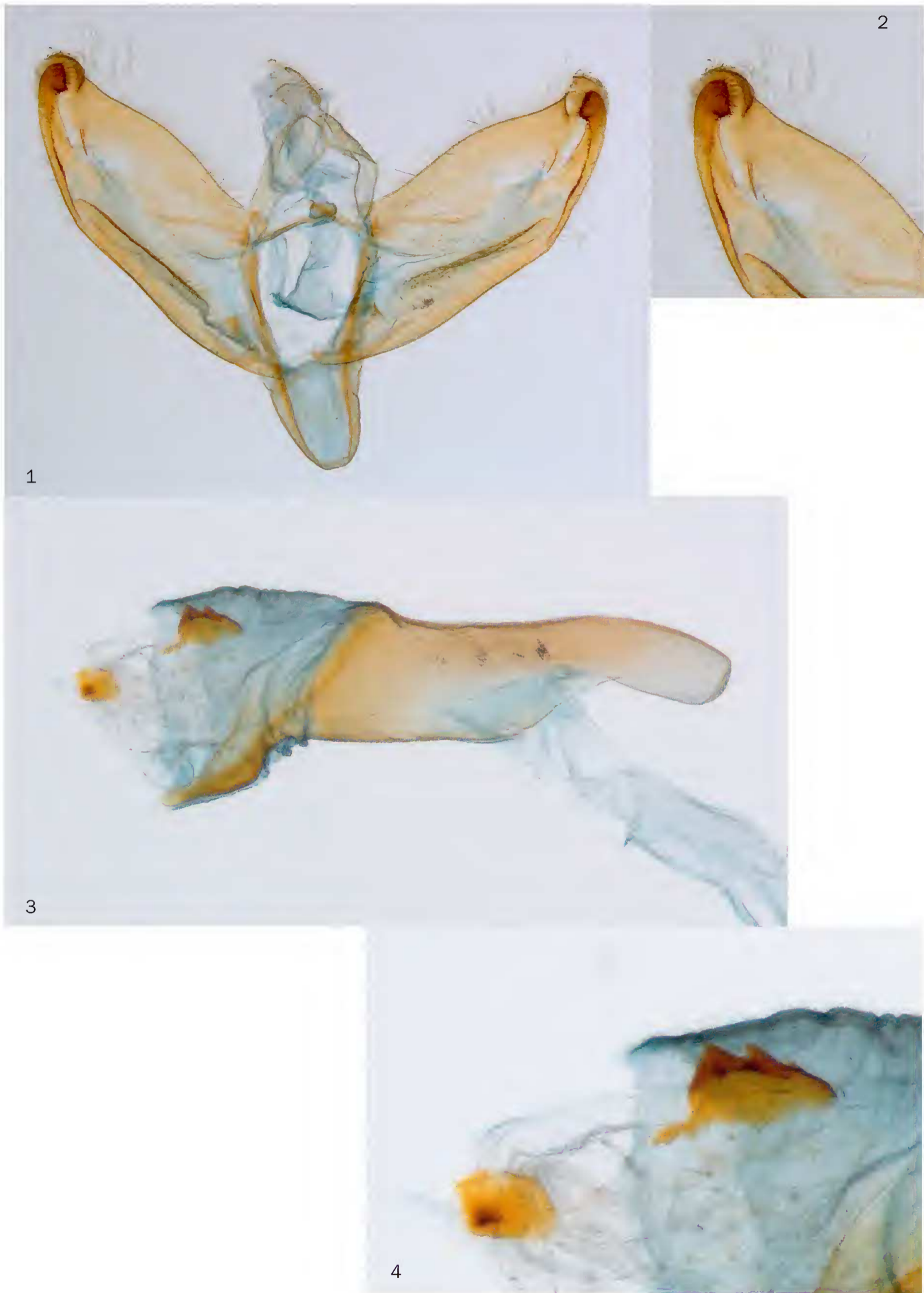
Vos, R. DE: The *Monosyntaxis* Swinhoe, 1901 complex of sibling species in New Guinea (Lepidoptera: Erebidae) ...



Figures 1-5. 1 - *Monosyntaxis postfuscata* sp. nov., ♀ holotype, Saiko, Upper Waria River, Papua New Guinea (BMNH); 2-5 - Male genitalia of *Monosyntaxis bipunctata* (Bethune-Baker, 1904). 2 - Habitus; 3 - Apex of valva; 4 - Aedeagus; 5 - Cornuti.

Plate 95

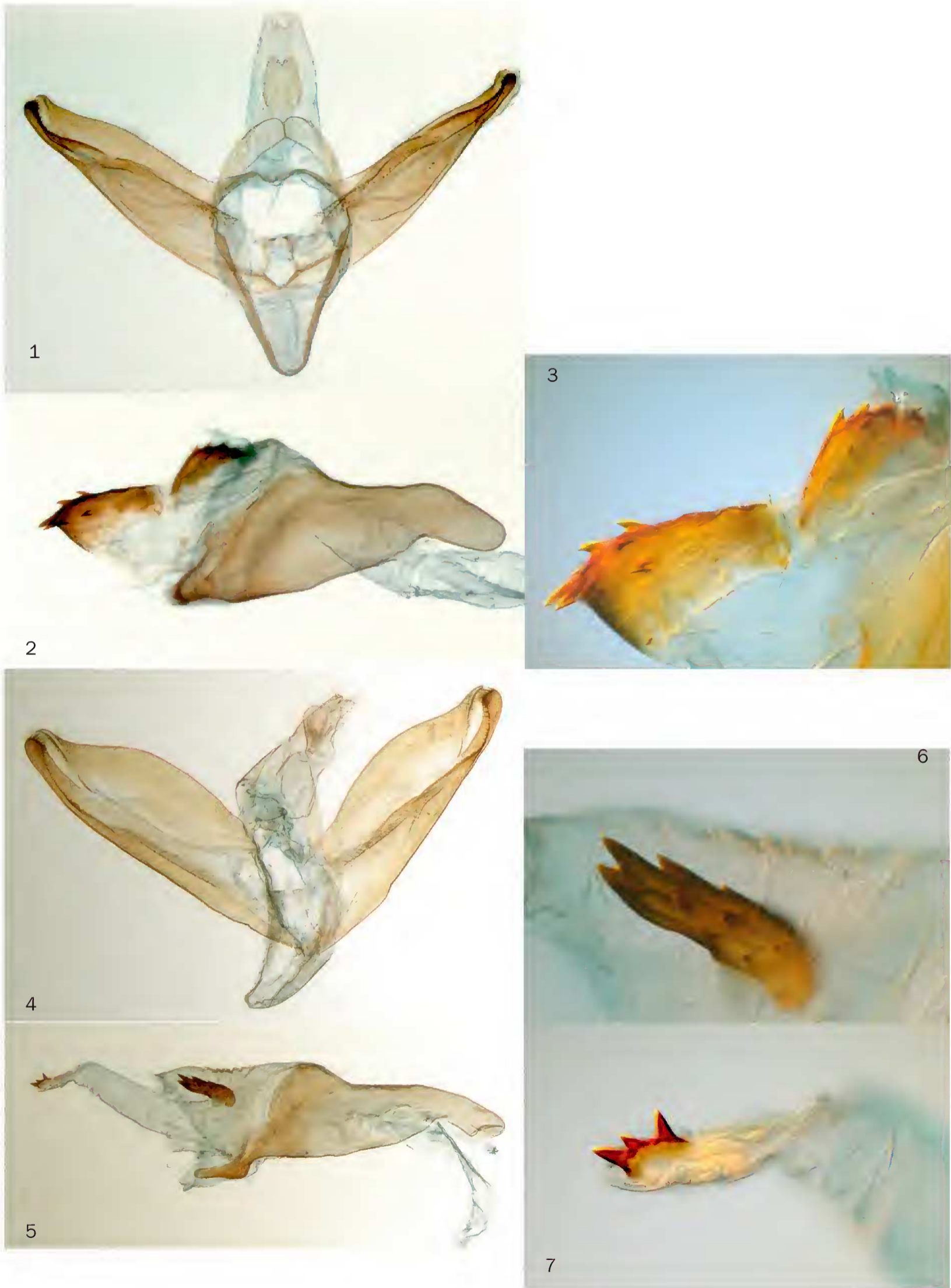
Vos, R. DE: The *Monosyntaxis* Swinhoe, 1901 complex of sibling species in New Guinea (Lepidoptera: Erebidae) ...



Figures 1-4. Male genitalia of *Monosyntaxis kratkeensis* sp. nov. 1 - Habitus; 2 - Apex of valva; 3 - Aedeagus; 4 - Cornuti.

Plate 96

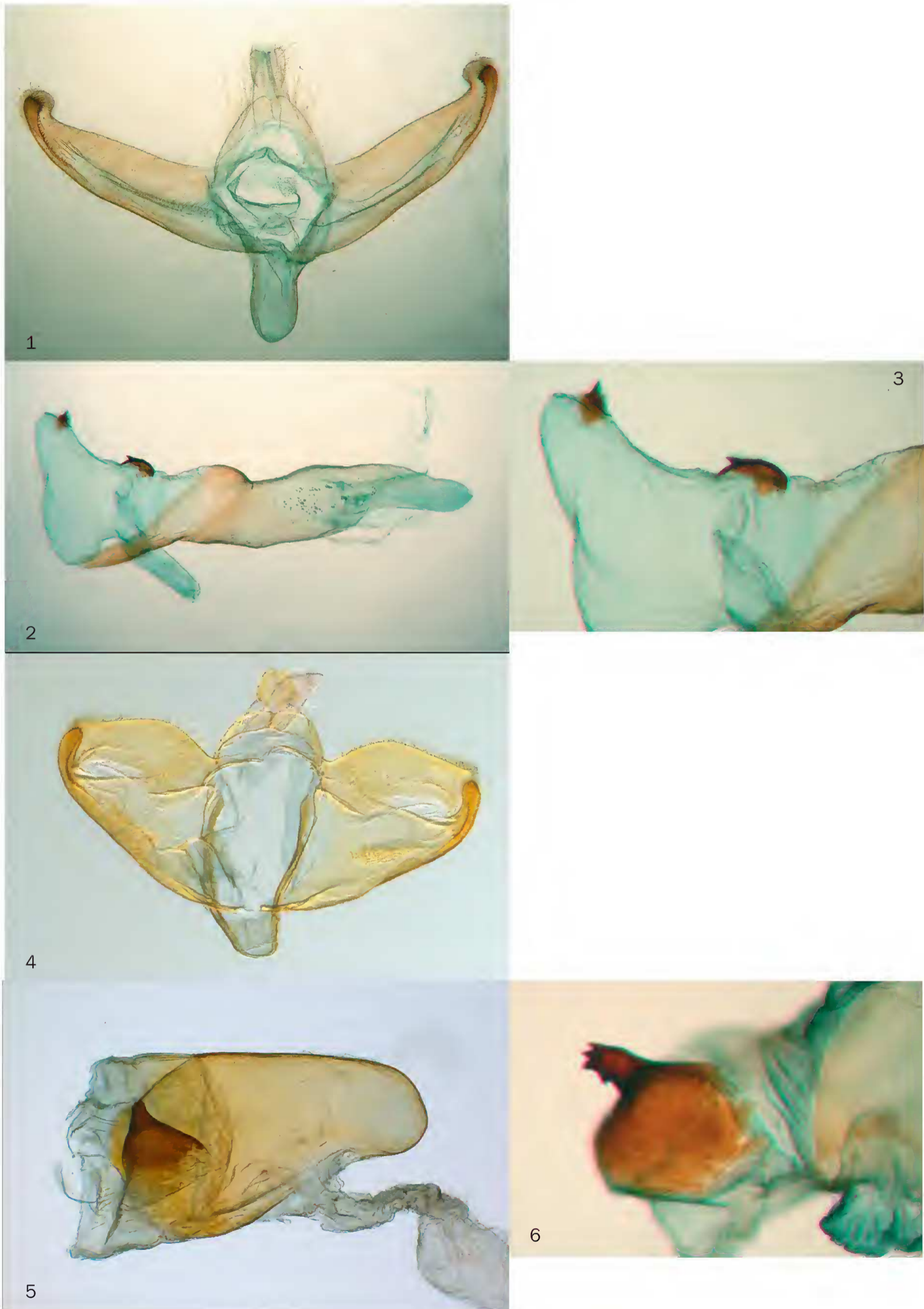
Vos, R. DE: The *Monosyntaxis* Swinhoe, 1901 complex of sibling species in New Guinea (Lepidoptera: Erebidae) ...



Figures 1-7. Male genitalia of *Monosyntaxis* species. 1-3: *M. honeyi* sp. nov. 1 - Habitus; 2 - Aedeagus; 3 - Cornuti; 4-7 - *M. fojaensis* sp. nov. 4 - Habitus; 5 - Aedeagus; 6 - Basal cornutus; 7 - Distal cornutus.

Plate 97

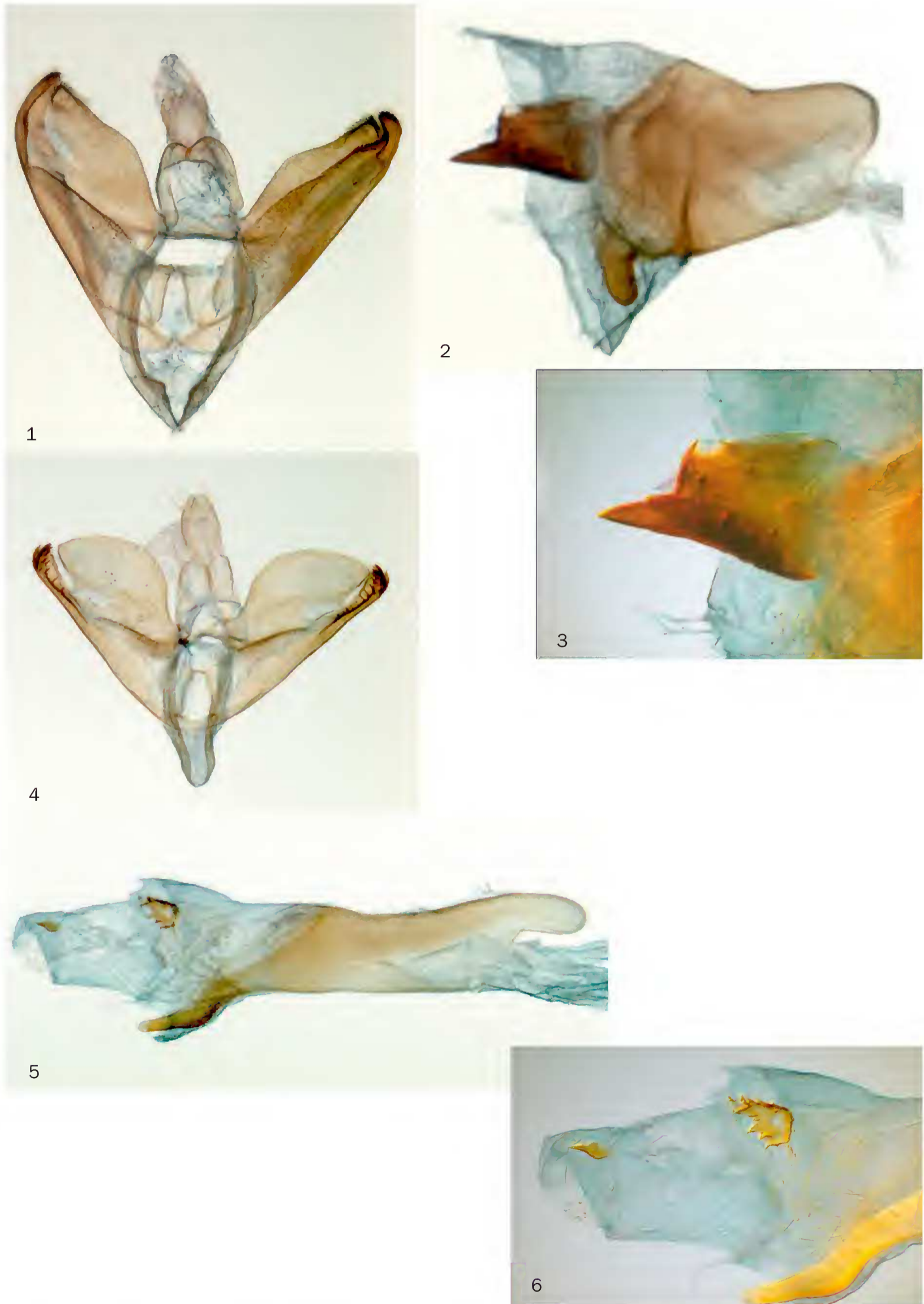
Vos, R. DE: The *Monosyntaxis* Swinhoe, 1901 complex of sibling species in New Guinea (Lepidoptera: Erebidae) ...



Figures 1-6. Male genitalia of *Monosyntaxis* species. 1-3: *M. kobowrensis* sp. nov. 1 - Habitus; 2 - Aedeagus; 3 - Cornuti; 4-6 - *M. arfakensis* sp. nov. 4 - Habitus; 5 - Aedeagus; 6 - Cornutus.

Plate 98

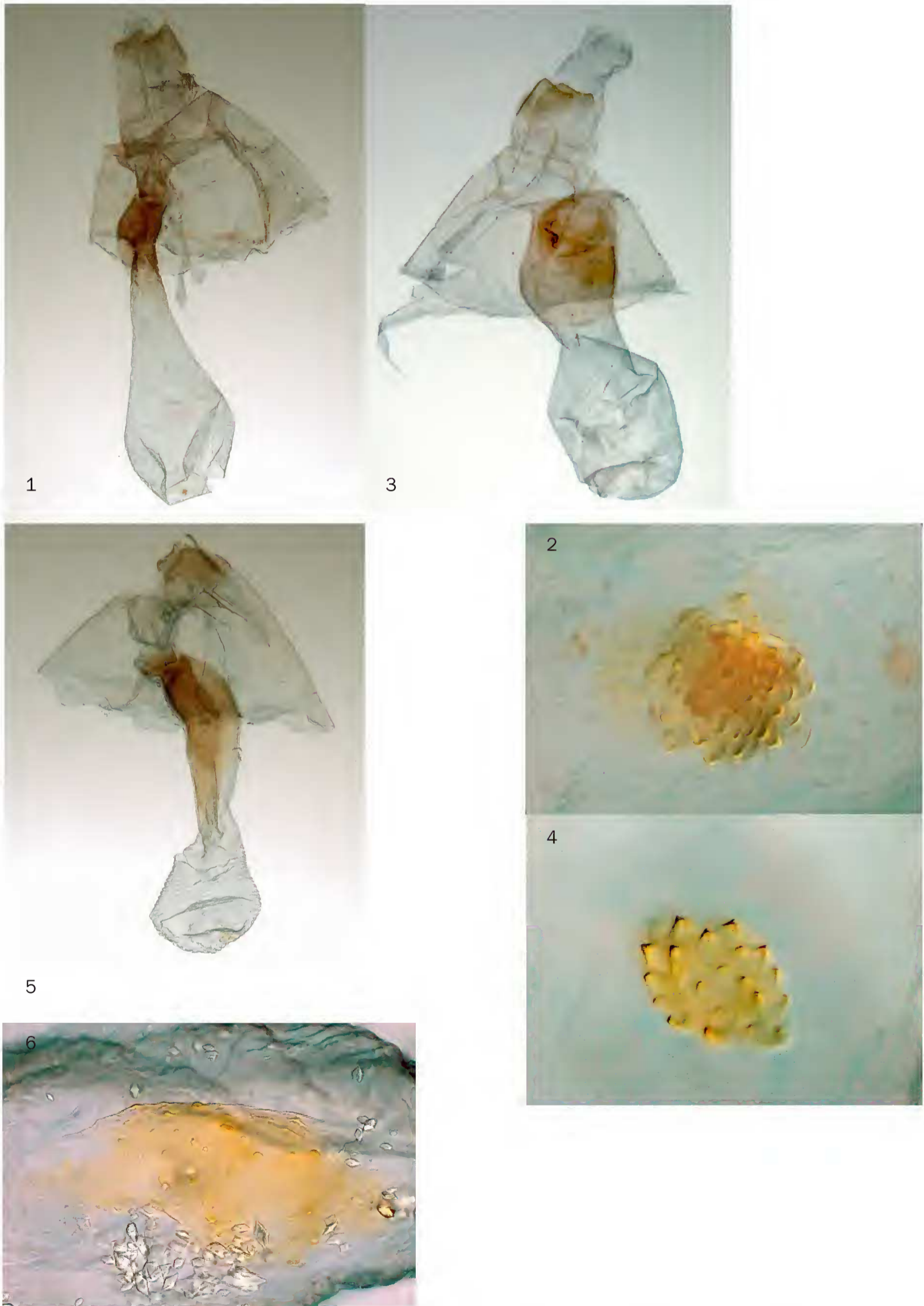
Vos, R. DE: The *Monosyntaxis* Swinhoe, 1901 complex of sibling species in New Guinea (Lepidoptera: Erebidae) ...



Figures 1-6. Male genitalia of *Monosyntaxis* species. 1-3 – *M. bimaculata* De Vos, 2009. 1 – Habitus; 2 – Aedeagus; 3 – Cornutus; 4-6 – *M. persimilis* Rothschild, 1912. 4 – Habitus; 5 – Aedeagus; 6 – Cornuti.

Plate 99

Vos, R. DE: The *Monosyntaxis* Swinhoe, 1901 complex of sibling species in New Guinea (Lepidoptera: Erebidae) ...



Figures 1-6. Female genitalia of *Monosyntaxis* species. 1-2 - *M. bipunctata* (Bethune-Baker, 1904). 1 - Habitus; 2 - Signum; 3-4 - *M. honeyi* sp. nov. 4 - Habitus; 5 - Signum; 5-6 - *M. fojaensis* sp. nov. 5 - Habitus; 6 - Signum.

Plate 100

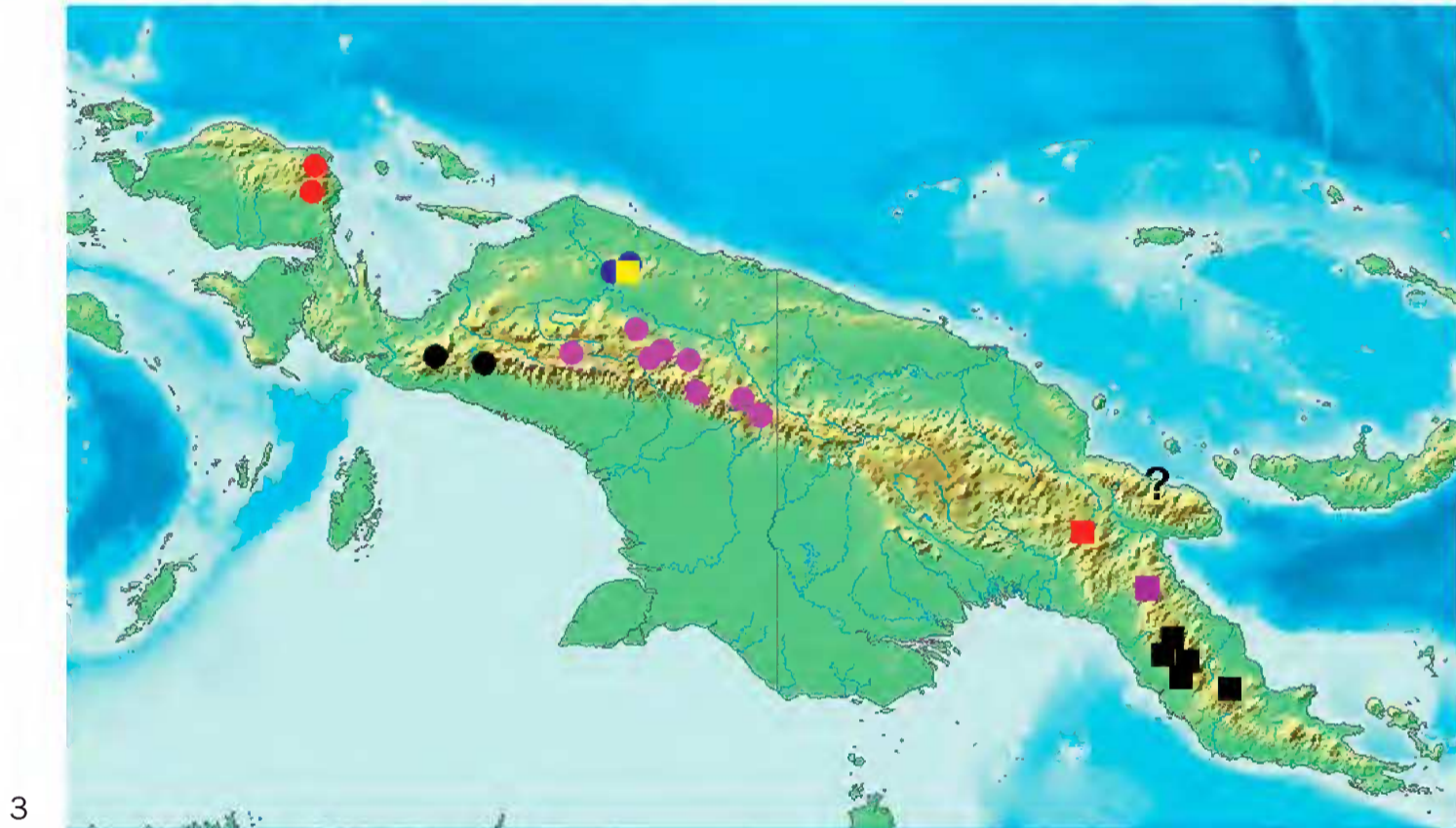
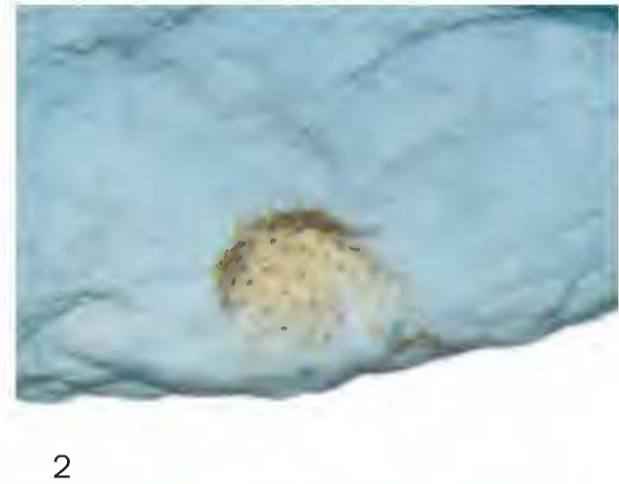
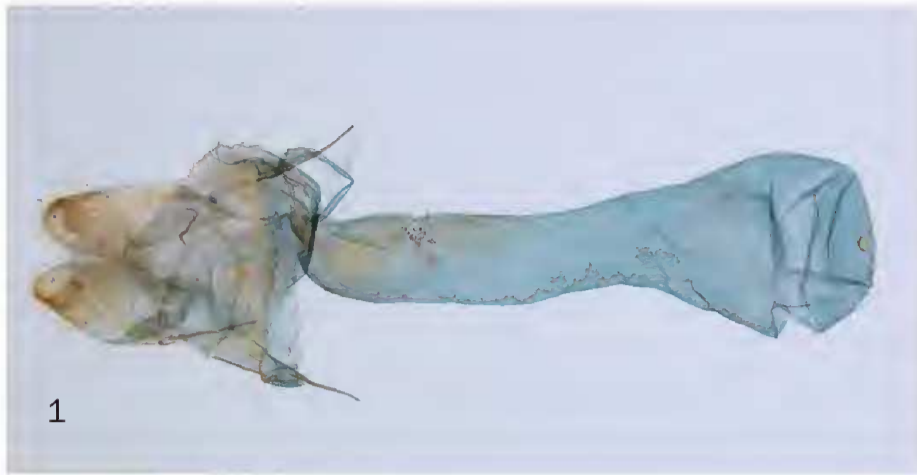
Vos, R. DE: The *Monosyntaxis* Swinhoe, 1901 complex of sibling species in New Guinea (Lepidoptera: Erebidae) ...



Figures 1-6. Female genitalia of *Monosyntaxis* species. 1-2 - *M. kobowrensis* sp. nov. 1 - Habitus; 2 - Signum; 3-4 - *M. arfakensis* sp. nov. 4 - Habitus; 5 - Signum; 5-6 - *M. persimilis* Rothschild, 1912. 5 - Habitus; 6 - Signum.

Plate 101

Vos, R. DE: The *Monosyntaxis* Swinhoe, 1901 complex of sibling species in New Guinea (Lepidoptera: Erebidae) ...



Figures 1-4. 1-2 - Female genitalia of *Monosyntaxis postfuscata* sp. nov. 1 - Habitus; 2 - Signum; 3-4 - Distribution maps of *Monosyntaxis* species. 3 - Red dots *M. arfakensis*, black dots *M. kobowrensis*, purple dots *M. honeyi*, blue dots *M. fojaensis*, yellow square *M. bimaculata*, red square *M. kratkeensis*, purple square *M. postfuscata*, black squares *M. bipunctata*; 4 - *M. persimilis*.